

REVISED VERSION

(19) World Intellectual Property
Organization
International Bureau



(43) International Publication Date
7 October 2004 (07.10.2004)

PCT

(10) International Publication Number
WO 2004/085079 A1

(51) International Patent Classification⁷: **B05B 17/06**

(21) International Application Number:
PCT/EP2004/002833

(22) International Filing Date: 17 March 2004 (17.03.2004)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
0307055.4 27 March 2003 (27.03.2003) GB

(71) Applicant (for AE, AG, AU, BB, BW, BZ, CA, CY, EG, GB, GD, GH, GM, IE, IL, KE, LC, LK, LS, MN, MW, NA, NZ,

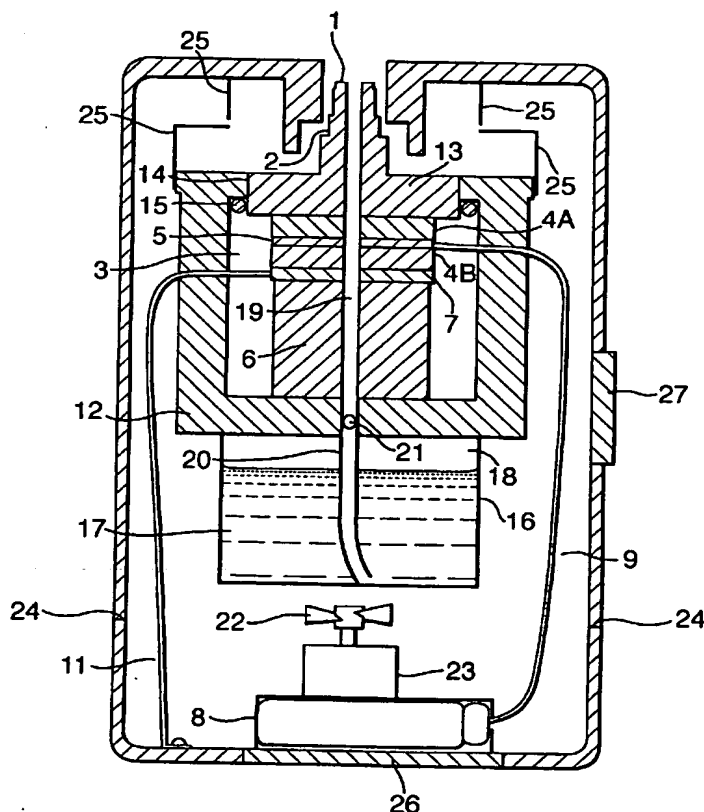
OM, PG, SC, SD, SG, SL, SZ, TT, TZ, UG, VC, ZA, ZM, ZW only): **UNILEVER PLC** [GB/GB]; Unilever House, Blackfriars, London, Greater London EC4P 4BQ (GB).

(71) Applicant (for AL, AM, AT, AZ, BA, BE, BF, BG, BJ, BR, BY, CF, CG, CH, CI, CM, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, FR, GA, GE, GN, GQ, GR, GW, HR, HU, ID, IS, IT, JP, KG, KP, KR, KZ, LR, LT, LU, LV, MA, MC, MD, MG, MK, ML, MR, MX, MZ, NE, NI, NL, NO, PH, PL, PT, RO, RU, SE, SI, SK, SN, SY, TD, TG, TJ, TM, TN, TR, UA, UZ, VN, YU only): **UNILEVER NV** [NL/NL]; Weena 455, NL-3013 AL Rotterdam (NL).

(71) Applicant (for IN only): **HINDUSTAN LEVER LIMITED** [IN/IN]; Hindustan Lever House, 165/166 Backbay Reclamation, Maharashtra, Mumbai, 400 020 (IN).

[Continued on next page]

(54) Title: SPRAY GENERATION USING A VIBRATING SURFACE



(57) Abstract: A method of generating a spray comprising subjecting a liquid on a continuous atomisation surface (1) to acoustic vibration, characterised in that the continuous atomisation surface (1) comprises multiple hollows from which the liquid is atomised.

WO 2004/085079 A1



(72) Inventors; and

(75) Inventors/Applicants (for US only): AVAL, Sattar, Motedayen [IR/GB]; University of Manchester, Institute of Science and Technology, PO Box 88, Sackville Street, Manchester, Greater Manchester M60 1QD (GB). KUTAY, Susan, Michelle [CA/GB]; Unilever R & D Port Sunlight, Quarry Road East, Bebington, Wirral, Merseyside CH63 3JW (GB). YULE, Andrew, John [GB/GB]; University of Manchester, Institute of Science and Technology, PO Box 88, Sackville Street, Manchester, Greater Manchester M60 1QD (GB).

(74) Agents: ELLIOTT, Peter, William et al.; Unilever Intellectual Property Group, Colworth House, Sharnbrook, Bedford, MK44 1LQ (GB).

(81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM,

TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.

(84) Designated States (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Published:

— with international search report

(88) Date of publication of the revised international search report: 12 May 2005

(15) Information about Correction:

see PCT Gazette No. 19/2005 of 12 May 2005, Section II

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

INTERNATIONAL SEARCH REPORT

International Application No
PCT/EP2004/002833

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 B05B17/06

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 B05B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, WPI Data, PAJ

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 97/17933 A (AEROPAG USA INC ; BABA EV ELIAZ P (US)) 22 May 1997 (1997-05-22) page 29, line 10 - line 16 claim 10 figures 3,17,18	1-23
X	DE 28 27 322 A (AUDI NSU AUTO UNION AG) 10 January 1980 (1980-01-10) page 6, last paragraph page 7, paragraph 2 figures 1,2,5	1-19,22, 23
A	----- -/--	20

☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

* Special categories of cited documents :

- "A" document defining the general state of the art which is not considered to be of particular relevance
- "E" earlier document but published on or after the international filing date
- "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- "O" document referring to an oral disclosure, use, exhibition or other means
- "P" document published prior to the international filing date but later than the priority date claimed

- "T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
- "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
- "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.
- "Z" document member of the same patent family

Date of the actual completion of the international search

21 June 2004

Date of mailing of the international search report

18 FEB 2005

Name and mailing address of the ISA

European Patent Office, P.B. 5818 Patentlaan 2
NL - 2280 HV Rijswijk
Tel: (+31-70) 340-2040, Tx. 31 651 epo nl,
Fax: (+31-70) 340-3016

Authorized officer

Barré, V

INTERNATIONAL SEARCH REPORT

International Application No

PCT/EP2004/002833

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	<p>WO 02/24150 A (ADVANCED MEDICAL APPLIC INC ; BABAEV ELIAZ (US)) 28 March 2002 (2002-03-28) page 6, line 9 - line 15 page 10, last paragraph - page 11, line 7; figures</p> <p style="text-align: center;">-----</p>	1-23

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/EP2004/002833

Patent document cited in search report		Publication date	Patent family member(s)		Publication date
WO 9717933	A	22-05-1997	WO 9717933 A1		22-05-1997
			AU 4238096 A		05-06-1997
DE 2827322	A	10-01-1980	DE 2827322 A1		10-01-1980
WO 0224150	A	28-03-2002	AU 9311201 A		02-04-2002
			BR 0114109 A		10-02-2004
			CA 2421798 A1		28-03-2002
			CN 1466445 T		07-01-2004
			EP 1322275 A2		02-07-2003
			WO 0224150 A2		28-03-2002